

REMARKS

Claims 1 - 38 are in this application and are presented for reconsideration. By this Amendment, Applicant has amended claims 1, 9, 12, 17, 19, 24, 26, 28, 31, and 33 to address issues raised in the Office Action by highlighting the important combination of features which define over the prior art of record..

Applicant thanks the Examiner for the careful reading of the application, and for providing suggestions. By this Amendment, the Applicant has amended several claims to overcome the Examiner's rejections and respectfully makes assertions for overcoming the rejections of the outstanding Office Action dated September 7, 2005 in the following paragraphs.

Claims 9, 10, 12, 13, 18 and 24-38 have been rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the Office pointed out several claims lacking proper antecedent basis because of the term "said surface zone[s]".

Applicant has amended the claims to address this issue. In addition, Applicant clarified that in claim 28, the said longitudinal direction is the same as the main longitudinal direction.

Furthermore, the Office objected to the contradicting terms in Claim 28 including "a feeding means for feeding said substrate above said sources, in a feeding direction parallel to said longitudinal direction"

Applicant has clarified this combination of feature by amending the feeding direction to be different from the longitudinal direction. This is shown in Figs. 11 and 12.

Finally, Applicant has clarified "said surface means" in claim 28, line 16 as well.

Claims 1-38 have been rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The Patent Office states that the specification as originally filed did not include the newly added limitation of "enhancing the adhesion of molten metal in a location".

This has been discussed extensively in the disclosure of the present invention. However, instead of using the specific term as described above, a wettability has been used to describe the adhesiveness. To further advance the prosecution of this Application, Applicant has amended the independent claims to use the wettability instead.

Claims 1 - 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schonherr (5,321,792) taken in view of Achtner (5,788,769), Kleyer 1 (5,179,622) and DE-970246. The rejection is based on the Office position that Schonherr obviating the present invention in light of the other references.

It is Applicant's position that claims 1-16 are not obvious over the Schon herr reference in view of the other secondary references. The present invention as claimed provides for a combination of features not taught by the prior art as a whole including the above references. For instance, there are several differences for the present invention as claimed.

Specifically, the present invention as claimed provides for two separate surface means spaced apart from each other but in such a close proximity to each other that the two surface means maintain a continuous conductive cross section means to metallize a strip substrate without reducing the conductive cross section.

The Office states that all references including the US patent number 5, 788, 769, U.S. Pat. No. 5, 179, 622, and DE -- 970246 (secondary references) -- -- teach that a resistively heated elongated source having plural pools of molten metal on the surface of the source will provide improved performance in comparison to a resistively heat source having one elongated pool -- --. However, the following differences has been highlighted.

Concerning DE 970246, this reference clearly refers to a source which is not fed continuously with a wire of metal. Applicant directs the office to the specification, page 2, third paragraph. Therefore, this reference cannot be combined with the primary reference. The teaching of the secondary reference is inconsistent with the teaching of the primary reference. Furthermore, the source disclosed in the DE 1970246 is characterized by discontinuities (c, d, g,) which locally increased the resistivity of the vaporization boat. The present invention, according to the Application, no such discontinuities (reduction of conductive cross-section) exist between the areas where the pools of molten metal forms. This difference is of paramount importance and will be explained later on.

Concerning the U.S. Pat. No.' 769 reference, once again discontinuities (holes 12) are provided between adjacent pools of molten metal. This is indeed the main point of the invention claimed and disclosed in the US. Patent number' 769 reference. This reference teaches as an essential point, to introduce reduction of cross section between adjacent metal pools is an essential feature of the vaporization source.

The U.S. Pat. No.' 622 reference does not disclose a single vaporization source having to pools of metal, but rather an assembly of two physically separated vaporization sources

arranged in series. Each vaporization source has one single pool of molten metal. The arrangement of two adjacent vaporization sources in the series is complicated.

The purpose of the discontinuities in the U.S. Pat. No. '769 reference is to keep the pools of molten metal separated from one another. Where the holes 12 are arranged, a much higher amount of heat is generated. Therefore, a temperature peak is localized in correspondence of such holes. This, in some way, keeps the pools separated from one another.

The presence of discontinuities between adjacent pools have the following disadvantages:

- a. The vaporization source becomes a weak. The discontinuities reduced the mechanical resistance of the basic ceramic material.
- b. The production all the holes or any other discontinuity in the material is not on a detrimental because of the consequent reduction in mechanical properties, it also renders manufacturing more complicated and increases the risk of rejects.
- c. The discontinuity provided in the vaporization source produces the following effect (as disclosed in the prior art): the local cross-section of the conductive material is reduced. Local resistivity is thus increased correspondingly. In correspondence of the increased resistivity section, an increased amount of heat is generated. This leads to a higher local temperature. Up long been vaporization source points of sharply increased heat generation are thus formed, rare a corresponding drop in temperature increase takes place. If, for what ever reason, the amount of metal fed to the source is increased and the pool of

melted metal expands, the molten metal comes in contact with the hotter portion of the source. This gives rise to a risk of splashes. If molten metal splashes on the substrate being processed, the latter is damaged.

- d. The discontinuity in cross-section has the following additional disadvantage: if the amount of molten metal is increased, the overall cross-section of the mass of molten metal increases. Since the metal has a very low resistivity, the overall resistivity of the system formed by vaporization source and metal is lowered. The total amount of current flowing through the source is thus increased ( $\text{Current} = \text{Voltage} / \text{Resistivity}$ ). The power dissipated at the discontinuity's increases with the second power of the current intensity. In other words, an increased amount of molten metal on the vaporization source causes a dramatic increase of heat dissipation in the area where the discontinuities are formed. This, on the one hand, increases the risk of splashes and on the other, increases the amount of molten metal. This renders the system unstable and uncontrollable, for the reason explained in the next paragraph.
- e. The amount of wire fed to the vaporization source may be varied based on a control loop which it receives as an input information, the thickness of the coating on the substrate. If the thickness of the coating (measured downstream of the process roll 19 (Figure 1 of the captioned application) is too low, the control unit generates a signal increasing the amount of wire feeding rate. The amount of molten metal increases. As explained in the preceding paragraph, the

increased amount of molten metal causes an increase in the heat generated by the source. The increased heat generation in turn increases the amount of metal, which is to cause to melt. The system becomes unstable and uncontrollable.

The U.S. Pat. No. '769 reference does not provide for any mechanical means to separate one pool from the other. Two adjacent pools may touch each other if the dimension of either one or both of them increases as a consequence of an increased wire feeding speed (example, due to the feedback loop of the machine);

It emerges from above, that two features are novel and important in the sources according to the invention.

- a. The absence of discontinuities (understood as cross-section reductions) between adjacent pools of molten metal
- b. The presence of some kind of mechanical feature on the surface of the source which helps in keeping the pools physically separated.

The second feature is provided by either the surface depressions (41A., 41B, 41C), which form separate pools, or else by a local incisions (example, the laser incisions) or other surface treatments, which increased local wettability of the upper surface of the vaporization sources.

The only secondary reference, which discloses a single source (rather than to sources as in the U.S. Pat. No. '622 reference,) fed with a continuous wire and having a plurality of pools of metal is the U.S. Pat. No. 769 reference. The latter, however, discloses a single of depression extending along the whole longitudinal area of the vaporization source. There is no

mechanical means to avoid the molten metal areas to come into contact. Nor is there any means to avoid the molten metal contacting the very hot areas surrounding the holes 12 (such that the above discussed disadvantages result).

None of the other prior art references teach to machine or manufacture the vaporization sources such that a single body (not to a separate sources as the U.S. Pat. No. 622 reference) has physically separated areas where a pool of molten metal can be formed, in the absence of cross-section reductions between adjacent pools.

DE' 246 teaches "chambers" (B) where the metal to be vaporized is introduced. However, as stated above, this known vaporization source is not suitable for continuous feeding with the wire, such that the skilled in the art will not have even looked into this reference. Additionally,

- a. as already stated, discontinuities are arranged between adjacent "chambers" (B.);
- b. The pools (chambers b) are aligned transversely to the feed direction of the substrate, such that the provision of a plurality of pools serves here a different purpose, and explicitly, to provide vaporized metal across the whole width of the substrate, where as in the claimed application, a plurality of pools are aligned along the that feed direction or slightly inclined they are two (figures 11, 12,) such that the substrate passes above more than one vaporization source, such that a better coating is obtained.

Claims 8 - 13 have been rejected under 35 U.S.C. 103(a) as being unpatentable over

Schönherr (5,321,792) taken in view of Achtner (5,788,769), Kleyer 1 (5,179,622) and DE-970246 and in further view of Alexander (2,962,538).

Claim 13 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Schönherr (5,321,792) taken in view of Achtner (5,788,769), Kleyer 1 (5,179,622), DE-970246 and Alexander (2,962,538) and in further view of Anderson (3,770,529), Copley (4,914,270), Fukushima (6,765,174) or applicants' description of the prior art (page 8, line 32 to page 9, line 10 of applicants' specification).

Claims 17-20 and 23-27 have been rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Achtner (5,788,769).

Claims 21 and 22 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Achtner (5,788,769) taken in view of DE-970246 and/or Kleyer 1 (5,179,622).

Claims 17-27 have been rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over DE-970246 (see figs. 1-7) or Kleyer 1 (5,179,622).

Claims 24-27 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Achtner (5,788,769), DE-970246 or Kleyer 1 (5,179,622), each taken in view of Alexander (2,962,538).

Claim 27 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Achtner (5,788,769), DE-970246 or Kleyer 1 (5,179,622), each one taken in view of Alexander (2,962,538), and taken in further view of Anderson (3,770,529), Copley (4,914,270), Fukushima (6,765,174), or applicants' description of the prior art (page 8, line 32 to page 9,



line 10).

Claims 28-38 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Kleyer 11 (5,198,032) in view of Yamaji (JP 1-219157) or Schonherr (5,321,792) and in further view of Achtner (5,788,769), Kleyer 1 (5,179,622) and DE-970246.

Claims 32-35 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Kleyer 11 (5,198,032) in view of Yamaji (JP 1-21 91 57) or Schonherr (5,321,792) and in further view of Achtner (5,788,769), Kleyer 1 (5,179,622) and DE-970246, and in further view of Alexander (2,962,538).

Other references also fail to disclose the combination of features where the reduction of conductive cross section is eliminated. Thus, none of the references mentioned above either anticipates or suggests the present invention as claimed.

As the prior art fails to suggest the combination of features as claimed, Applicant respectfully requests that the Examiner reconsider the rejection in view of the amended claims and in view of the discussion above. Applicant respectfully solicits allowance of this application.

It is applicant's position that all claims are now allowable. Should the Examiner determine that issues remain that have not been resolved by this response, the Examiner is requested to contact Applicant's representative at the number listed below.